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## 5 **Abstract**

6 A cross-sectional study was carried out from November 2009 to march 2010 on bovine  
7 fasciolosis in and around Assela and at Assela municipal abattoir to assess its prevalence and  
8 economic importance. From total of 400 cattle examined coprlogically 45.25

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10 **Index terms**— Assela, Bovine, Economic significant, Fasciola, Prevalence.

## 11 **1 INTRODUCTION**

12 fasciolosis is an economically important parasitic disease, which caused by trematodes of the genus *Fasciola* that  
13 migrate in the hepatic parenchyma, and establish and develop in the bile ducts (30). *Fasciola* is commonly  
14 recognized as liver flukes and they are responsible for wide spread of morbidity and mortality in cattle  
15 characterized by weight loss, anemia and hypoproteinemia. The two most important species, *Fasciola hepatica*  
16 found in temperate area and in cooler areas of high altitude in the tropics and subtropics and *Fasciola gigantica*,  
17 which predominates in tropical area. *Fasciola hepatica* is found in area above 1800 m.a.s.l. In between these  
18 altitude limits, both species coexists where ecology is conductive for both snail hosts, and mixed infections  
19 prevailed (35). The snail of the genus *Lymnaea natalensis* and *Lymnaea truncatula* are known as intermediate host  
20 in life cycle of fasciolosis. Infection with *Lymnaea truncatula* is usually associated with herds and flocks grazing  
21 wet marshy land. On the other hand, *Fasciola gigantica* is a fresh water snail and infection with this species is  
22 associated with livestock drinking from snails infected watering places as well as with grazing wetland, which may  
23 be seasonally in undated (22). Fasciolosis is an economically important disease of domestic livestock, in particular  
24 cattle and sheep and occasionally man Ahmed et al. (3). The disease is responsible for considerable economic  
25 losses in the cattle industry, mainly through mortality, liver condemnation, reduced production of meat, milk,  
26 and wool, and expenditures for anthelmintics (11) and (19). The world-wide losses in animal productivity due  
27 to fasciolosis were estimated at US \$200 million per annum, to rural agricultural communities and commercial  
28 producers (8), with over 600 million animals infected Ramajo et al. ??26). In developed counties, the incidence  
29 of *F. hepatica* can reach up to 77%. In tropical countries, fasciolosis is considered the single most important  
30 helminth infection of cattle, with reported prevalence of 30-90% Spithill et al. (28). The prevalence of fasciolosis  
31 in many parts of Africa has been determined mainly at slaughter. However estimation of economic loss due to  
32 fasciolosis at national or regional level is limited by lack of accurate estimation of the prevalence of disease Phiri  
33 et al. (23).

34 The presence of fasciolosis due to *F. hepatica* and *F. gigantica* in Ethiopia has long been known and its  
35 prevalence and economic significance has been reported by several workers ( ??7), ( ??6), ( ??), (35), (36),  
36 (29), Fufa et al. (15). Available published reports have indicated that bovine fasciolosis causes economic losses  
37 of roughly 350 million Birr per annum due to deceased productivity alone (5). More recently, (29) and Fufa  
38 et al. ( ??5) have reported financial losses of 6300 USD and 4000 USD per annum, respectively due to liver  
39 condemnations at slaughter houses.

40 Assela is one of town in Ethiopia, located in the South-east of Addis Ababa where huge livestock populations  
41 are found. The major land cover is thus used for grazing which support on an average 27 livestock per hectare.  
42 Livestock are major agricultural resource in the area. Assela is one of the areas where the environmental conditions  
43 and altitude of the area is conducive for the occurrence of fasciolosis. However; little information is available  
44 about its prevances and its economic significance in the study area. Therefore, the b) The study sites Tiyo Woreda  
45 has 18 Peasant Aassociations (PA) and out of these only three representative PAs (Dosha, Kobolcha area, and  
46 Kulumsa) were selected by considering their similarity in production system, their differences in altitude and  
47 livestock populations.

## 7 A) COPROLOGICAL FINDING

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### 48 2 c) Study population

49 During sampling of the study animals in the present study, sexes, ages and body conditions of all the sampled  
50 cattle from the selected three PAs of Tiyo woreda were recorded.

### 51 3 d) Sample size Determination

52 Since there was no previous study in Tiyo woreda to establish the prevalence and economic significance of bovine  
53 fasciollosis, the sample size was determined by taking the prevalence of 50% fasciollosis using the formula given  
54 by (31).  $n = 1.96^2 \cdot P \exp(1-P\exp) d^2$

55 Where  $n$  = required sample size  $P$  exp = expected prevalence = 50%  $d$  = desired absolute precision = 5% Hence,  
56  $d = 0.05$  and  $p = 0.5$  (50%).

57 Accordingly 384 animals were supposed to be sampled but in order to increase the precession a total of 400  
58 study animals were used.

### 59 4 e) Study Design and Sampling Method

### 60 5 f) Study Methodology i. Coprological Examination

61 Faecal samples for parasitological examination were collected directly from the rectum of each animal and freshly  
62 defected faeces in to plastic bottles with gloved hand. The samples were clearly labeled with universal bottles  
63 preserved with 5% formalin and each sample was clearly labeled with animal's identification, date and place  
64 of collection. Samples were packed and dispatched in cool box to avoid development of eggs and hatching. In  
65 the laboratory, coproscopic examination was performed to detect the presence of fasciola eggs using the standard  
66 sedimentation techniques (18).

67 ii.

68 Active abattoir survey was conducted based on cross sectional study during routine meat inspection on  
69 randomly selected cattle slaughtered at Assela municipal abattoir. A total of 183 cattle were examined during  
70 the study. During ante-mortum examination detail records about the species, breeds, sexes, origins and body  
71 conditions of the animals were performed. The origin of the animal and age whenever possible while body  
72 condition scoring based on (20). During postmorton inspection, each liver visually inspected, palpated and  
73 incised based on routine meat inspection by ( ??4). All livers having *Fasciola* species condemned were registered  
74 and flukes were conducted for species identification.

75 iii. Species Identification After making systematic incision on liver parenchyma, and bile ducts, flukes were  
76 collected in the universal bottle containing 10% formalin in preservative and examined to identify the involved  
77 species. *Fasciola gigantica* (20 -75 mm x 3.12mm) resembles *Fasciola hepatica* (20 -30mm x 10mm) but readily  
78 recognized by its larger size, the shoulders are not prominent and the body is more transparent. It is grayish-  
79 brown in color changed to grey when preserved (27). iv. Economic loss assessment . The total economic loss due  
80 to fasciollosis in cattle slaughtered from the summation of annual liver condemnation cost (direct loss) and cost  
81 due to carcass weight reduction (indirect loss) was assessed. v.

82 Direct economic loss was resulted from condemnation of liver affected by fasciollosis. All livers affected with  
83 fasciollosis were totally condemned. The annual loss from liver condemnation was assessed by considering the  
84 overall annually slaughtered animal in the abattoir and retail market price of an average zebu liver. Annual  
85 slaughtered rate was estimated from Direct Economic loss Abattoir Survey retrospective abattoir records of the  
86 last three years, while retail market price of an average size zebu liver was determined from the information  
87 collected from butcheries in Assela Town. The information obtained was subjected to mathematical computation  
88 using the formula set by (21).  $ALC = CSR \times LC \times P$  Where  $ALC$  = Annual loss from liver condemnation  
89  $CSR$  = Mean annual cattle slaughtered at municipality abattoir  $LC$  = Mean cost of one liver in Assela Town.  
90  $P$  = Prevalence rate of the disease at the study abattoir vi.

91 Indirect economic loss was associated with carcass weight reduction due to fasciollosis. A 10% carcass weight  
92 loss in cattle is due to fasciollosis. Average carcass weight of an Ethiopian Zebu was taken as 126 kg (20). The  
93 annual carcass weight loss due to bovine fasciollosis assessed using the following formula set by (21). All the data  
94 collected during the study period were stored in excel spreadsheet for statistical analysis and were analyzed using  
95 intercooled stata 7.0 for windows (2001) to determine prevalence and analyze the associations with risk factors.

96 iii.

## 97 6 RESULTS

### 98 7 a) Coprological finding

99 From a total of 400 faecal samples examined from cattle during the study period, 181 (45.25%) samples were  
100 found positive for fasciollosis.

101 The prevalence of bovine fasciollosis between the two sexes in the current study (table 1) revealed 62.73%  
102 (female) and 11.67% (male) and differ significantly ( $p < 0.05$ ). From the result of the present study on the  
103 prevalence of fasciollosis between different age groups showed an inverse correlation (table 1) and also the  
104 prevalence of fasciollosis was statistically significant difference ( $p < 0.05$ ) between cattle of different age groups.

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## 105 8 b) **Fasciola species Identification**

106 From the total of 183 slaughtered animals whose liver were inspected in the abattoir, 64 livers were *Hepatica*, 16  
107 livers (25%) harbored with *F.gigantica* and the remaining 6 livers (9.375%) harbored mixed infection.

108 Table ?? of the present study shows that there was no a statistical significant difference ( $p>0.05$ ) in the  
109 prevalence of fasciolosis in cattle with different body conditions. But the higher prevalence (75%) was observed  
110 with cattle whose body conditions were thin and the lowest prevalence (40%) was recorded for cattle whose body  
111 conditions were good.

112 The prevalence of Bovine Fasciolosis between the three different study sites in the present study (table ??)  
113 showed the presence of variability on the prevalence of Bovine Fasciolosis between them. The highest (54.13%)  
114 and the lowest (39.61%) prevalence Bovine Fasciolosis were observed Kulumsa and Dosha, respectively.

115 The prevalence of bovine fasciolosis in each month of the study periods was also indicated in table ???. The  
116 table shows the presence of significant difference ( $p<0.05$ ) in the prevalence of bovine fasciolosis between each  
117 month of the study periods. The highest (69.767%) and the lowest (32.18%) prevalence were observed in March  
118 and November, respectively. c) Economic loss assessment i.

119 Direct economic loss was resulted from liver condemnation as the result of fasciolosis. Generally all infected  
120 livers with fasciolosis are unfit for human consumption. The 64 fasciolosis infected livers of cattle were  
121 corresponding to an estimated total loss of about 805.71 ETB. In the study abattoir the average annual cattle  
122 slaughtered rate was estimated to be 3000 while mean retail price of bovine liver in Assela town as 36 ETB.  
123 Prevalence of fasciolosis in Assela municipality abattoir estimated as (34.97%). Therefore the estimated annual  
124 loss form organ condemnation is calculated according to the formula:  $ALC = CSR \times LC \times P = 3000 \times 36 \times$   
125  $ETB \times 34.97\% = 3000 \times 36 ETB \times 0.3497 = 37,767$ . Indirect Economic loss reduction due to bovine fasciolosis  
126 is calculated by using the formula:  $ACW = CSR \times CL \times BC \times P \times 126kg = 3000 \times 10\% \times 50 ETB \times 34.97\%$   
127  $\times 126kg = 3000 \times 0.1 \times 50 ETB \times 0.3497 \times 126kg = 660,933 ETB$  Therefore, the total annual economic loss  
128 due to bovine fasciolosis in the study abattoir is the summation of the losses from organ condemnation (direct  
129 loss) and carcass weight reduction (indirect loss) and thus a total of 698,700.6 ETB (51, 909.4056 USD). NB: 1  
130 USD was equivalent to 13.4600

## 131 9 IV. ISCUSSIONS

132 Fasciolosis is an important parasitic disease of domestic ruminants caused by two liver fluke species: *Fasciola*  
133 *hepatica* and *F. gigantica* (Trematoda). *Fasciola hepatica* has a cosmopolitan distribution, mainly in temperate  
134 zones, while *F. gigantica* is found in tropical regions of Africa and Asia.

135 Bovine fasciolosi exists in almost all region of Ethiopia. However, the prevalence, epidemiology and *Fasciola*  
136 species involved vary with locality. This is mainly attributed to the variation in the climate and ecological  
137 condition such as altitude, rainfall, temperature and livestock management system (17), (5). The result of  
138 present study indicated that bovine fasciolosis relatively spread with moderate prevalence of 45.25% in the study  
139 area as compared to high prevalence of 86% in Keffa (5), 80% in and around Debre Berhan (9), 88.57% and 82.5%  
140 in western shoa (33). Moreover, ( ??), ( ??4) and ( ??3) have reported prevalence of 61%, 52% and 62.2% in  
141 Gonder, around Tan, and around Bahir Dar, respectively. The result of these workers are relatively higher than  
142 the present finding and this variation might be attributed to the difference in the infestation, level of study area  
143 and the present study were conducted during the dry period of the year when the infections rate of fasciolosis is  
144 expected to be low. The result of the present study is similar with the prevalence of bovine fasciolosis reported  
145 at Jimma. Sodo and Ziway abattoirs by ( ??9), ( ??) and (2), respectively but higher than that of (10) from  
146 Dire Dawa municipality abattoir. This is probably due to the ecological and climatic difference between the two  
147 localities.

148 The results of the present study revealed that sex and age have significant effect on the prevalence of bovine  
149 fasciolosis. However, the work done by ( ??5) and ( ??) concluded that sex has no impact on the infection rate  
150 and hence both male and female are equally susceptible and exposed to the disease. The significant effects of sex  
151 on the prevalence of bovine fasciolosis might be attributed to the management system with longer exposure of  
152 male outdoor when females are kept indoor at the beginning of lactation (6).

153 Different works reported similar finding with the present work and clearly justified that the decrease in infection  
154 rate (prevalence) as age increase is the result of acquired immunity which is manifested by humeral respond and  
155 tissue reaction in bovine liver due to previous challenge (21), and Dwinger et al. ??12). They also reported that  
156 the increase resistance (low prevalence) as age increase is most likely related to the high level of tissue reaction  
157 seen in bovine liver, server fibrosis which impedes the passage of immature fluke, acquired resistance, thickening,  
158 stenosis and calcification of bile ducts, assumed unfavorable site for adult parasites and consequently fasten their  
159 explosion. Additionally the experimental result by (27) and Radostits et al. (24) confirmed the occurrence of  
160 higher infection rate in younger animals. Moreover, inverse corelation of prevalence and age of cattle were also  
161 reported by ( ??3), ( ??5), ( ??) and (7).

162 Post mortem examination on the 64 *Fasciola* infected livers of the current result indicated that *F. hepatica*  
163 and *F. gigantica* were the main fasciola species in the study areas, however, *F. hepatica* were found to be the  
164 predominant facsiola species causing bovine fasciolosis in the study areas. Similar study conducted at Jimma  
165 and Zeway abattoir reported 63.3% and 60.3% of the liver harbored *F. hepatica* ( ??9), (2), respectively. This  
166 is attributed mainly due to the variation in the climatic and ecological conditions such as altitude, rainfall,

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167 temperature and livestock management system (35). Moreover, Garber and Daynes reported that; in Ethiopia F.  
168 hepatica and F. gigantica infections occur in areas above 1800 m.a.s.l. and below 1200 m.a.s.l. respectively. The  
169 high prevalence rate of F. hepatica may be associated with the existence of favourable ecological biotops for L.  
170 truncatula. Relatively small proportion of cattle were found infected with F. gigantica alone or mixed infection  
171 with both spp. This may be explained by cattle coming for slaughter from highland and middle altitude zone  
172 flood prone areas, drainage ditches are favourable habitat to natalensis Urquhart et al. (32).

173 Infection rate of bovine fasciolsis was statistically analyzed on the base of body condition to study the impact  
174 of the disease in debilitating (emaciating) infected animals. The result of study indicated that infection rate has  
175 no significant difference ( $p>0.05$ ) on the prevalence of fasciolsis weather the animal in thin, moderate or good  
176 body conditions. This body condition in cattle manifested when fasciolsis reaches at its chronic stage even though  
177 there is a difference in infection rate between thin (75%), moderate (49%) and good (40%) body conditions. The  
178 monthly/seasonal/ variation in the prevalence of fasciolosis has been studded for 5 dry months in the study  
179 area. It was difficult to indicate the effect of seasonal variation on the prevalence of bovine fasciolosis since the  
180 study period was too short without incorporating wet months of the season. An accurate description of seasonal  
181 occurrence requires long term epidemiological investigation over several years. In this study high infection rate  
182 (69.767%) was encountered in March while lower infection (32.18%) in November having statistical significant  
183 difference ( $p<0.05$ ). However, (29) reported October was when the highest - v.

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## 185 11 CONCLUSIONS

186 The present study revealed that although a moderate prevalence of bovine fasciolosis in the study sites recorded;  
187 the prevalence was significantly affected by sex, age and months of the year. Higher prevalence of bovine fasciolosis  
188 was recorded in male cattle than females and in younger cattle ( $> 3$  yrs) than older ( $> 5$  yrs) ones. F. hepatica  
189 was found to be the predominant. facsiola species causing bovine fasciolsis in the study Finally the total annual  
190 economic losses due to bovine fasciolosis in the study abattoir from organ condemnation (direct loss) and carcass  
191 weight reduction (indirect loss) were high.



Figure 1:

## 1

Medical  
Research

Global Journal of	Sex	No of examined	No of sample	Positive	No of sample	Negative	Prevalence (%)	2	165	9
	M F	263	137							
		sample								
	Age									
	<3	69	35				34	50.72	1.271	
	3-5	191	118				73	61.78		
	>5	140	28				112	20		

Figure 2: Table 1 :

Species of fasciola	No. of lives condemned	Percentage (%)
F. hepatica	42	65.625
F. gigantic	16	25.00
Mixed	6	9.375
Total	64	

Figure 3: Table 2 :

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202 III Version I September (21) emphasized on the statement that even if it is realized estimating the actual economic  
203 loss due to individual parasitic disease is difficult, this should not be medicate against an attempt to emphasize  
204 the cause of the disease. The direct economic loss incurred during this study as a result of condemnation of  
205 liver of cattle was estimated about 37, 767.6 ETB per annum and indirect economic loss due to carcass weight  
206 reduction was estimated about 660, 933 ETB per annum. Therefore, the total annual economic loss due to  
207 fasciolosis in the study abattoir is the summation of losses from organ condemnation and carcass weight reduction  
208 which is equal to 698,700.6 ETB. This finding is by far lower than the result reported by ( ??9), ( ??) and (10) a  
209 total economic loss of about 55,080.00, 154, 188 and 215,000 Ethiopian birr per annum in cattle due to fasciolosis  
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